Practitioner's Docket No. 60680-1281

CHAPTER II

TRANSMITTAL LETTER TO THE UNITED STATES ELECTED OFFICE (EO/US)

(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE98/00065	07 January 1998	10 January 1997

TITLE OF INVENTION

METHOD FOR PRODUCING A HEAT SHIELD AND HEAT SHIELD PRODUCED BY THIS METHOD

APPLICANT(S)

Bernd Bretschneider; Kai-Uwe Lemke; Dieter Grafl

Box PCT
Assistant Commissioner for Patents
Washington D.C. 20231
ATTENTION: EO/US

NOTE: To avoid abandonment of the application, the applicant shall furnish to the USPTO, not later than 20 months from the priority date: (1) a copy of the international application, unless it has been previously communicated by the International

CERTIFICATION UNDER 37 C.F.R. 1.10*
*(Express Mail label number is **mandatory**.)*
(Express Mail certification is optional.)

I hereby certify that this correspondence and the documents referred to as attached therein are being deposited with the United States Postal Service on this date 07/07/99, in an envelope as "Express Mail Post Office to Addressee," Mailing Label Number EL323240991US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Stephanie A. Frash
(type or print name of person mailing paper)

Stephanie A. Frash
Signature of person mailing paper

WARNING: *Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.*

WARNING:* *Each paper or fee filed by "Express Mail" **must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. 1.10(b).*
*"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.*

Bureau or unless it was originally filed in the USPTO; and (2) the basic national fee (see 37 C.F.R. § 1.492(a)). The 30-month time limit may not be extended. 37 C.F.R. § 1.495.

WARNING: *Where the items are those which can be submitted to complete the entry of the international application into the national phase are subsequent to 30 months from the priority date the application is still considered to be in the international state and if mailing procedures are utilized to obtain a date the express mail procedure of 37 C.F.R. §1.10 must be used (since international application papers are not covered by an ordinary certificate of mailing - See 37 C.F.R. §1.8.*

NOTE: Documents and fees must be clearly identified as a submission to enter the national state under 35 USC 371 otherwise the submission will be considered as being made under 35 USC 111. 37 C.F.R. § 1.494(f).

1. Applicant herewith submits to the United States Elected Office (EO/US) the following items under 35 U.S.C. 371:

   a. [X] This express request to immediately begin national examination procedures (35 U.S.C. 371(f)).

   b. [X] The U.S. National Fee (35 U.S.C. 371(c)(1)) and other fees (37 C.F.R. § 1.492) as indicated below:

2.Fees

CLAIMS FEE	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
[ ]*	TOTAL CLAIMS	1- 20 =		x $ 18.00 =	$
	INDEPENDENT CLAIMS	1- 3 =		x $ 78.00 =	
	MULTIPLE DEPENDENT CLAIM(S) (if applicable) + $260.00				
BASIC FEE**	[ ] U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where an International preliminary examination fee as set forth in § 1.482 has been paid on the international application to the U.S. PTO: [ ] and the international preliminary examination report states that the criteria of novelty, inventive step (non-obviousness) and industrial activity, as defined in PCT Article 33(2) to (4) have been satisfied for all the claims presented in the application entering the national stage (37 CFR 1.492(a)(4)) ..... $96.00 [ ] and the above requirements are not met (37 CFR 1.492(a)(1)) ..... $670.00 [X] U.S. PTO WAS NOT INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where no international preliminary examination fee as set forth in § 1.482 has been paid to the U.S. PTO, and payment of an international search fee as set forth in § 1.445(a)(2) to the U.S. PTO: [ ] has been paid (37 CFR 1.492(a)(2)) ..... $760.00 [ ] has not been paid (37 CFR 1.492(a)(3)) ..... $970.00 [X] where a search report on the international application has been prepared by the European Patent Office or the Japanese Patent Office (37 CFR 1.492(a)(5)) $840.00				
	Total of above Calculations				= 840.00
SMALL ENTITY	Reduction by ½ for filing by small entity, if applicable. Affidavit must be filed. (note 37 CFR 1.9, 1.27, 1.28)				-
	Subtotal				840.00
	Total National Fee				$ 840.00
	Fee for recording the enclosed assignment document $40.00 (37 CFR 1.21(h)). (See Item 13 below). See attached "ASSIGNMENT COVER SHEET".				
TOTAL	Total Fees enclosed				$ 840.00

*See attached Preliminary Amendment Reducing the Number of Claims.

i. [ ] A check in the amount of _____ to cover the above fees is enclosed.

ii. [X] Please charge Account No. 18-0013 in the amount of $ 840.00.
A duplicate copy of this sheet is enclosed.

**WARNING: *"To avoid abandonment of the application the applicant shall furnish to the United States Patent and Trademark Office not later than the expiration of 30 months from the priority date: * * * (2) the basic national fee (see § 1.492(a)). The 30-month time limit may not be extended." 37 C.F.R. § 1.495(b).*

WARNING: *If the translation of the international application and/or the oath or declaration have not been submitted by the applicant within thirty (30) months from the priority date, such requirements may be met within a time period set by the Office. 37 C.F.R. § 1.495(b)(2). The payment of the surcharge set forth in § 1.492(e) is required as a condition for accepting the oath or declaration later than thirty (30) months after the priority date. The payment of the processing fee set forth in § 1.492(f) is required for acceptance of an English translation later than thirty (30) months after the priority date. Failure to comply with these requirements will result in abandonment of the application. The provisions of § 1.136 apply to the period which is set. Notice of Jan. 3, 1993, 1147 O.G. 29 to 40.*

3. [X] A copy of the International application as filed (35 U.S.C. 371(c)(2)):

NOTE: *Section 1.495 (b) was amended to require that the basic national fee and a copy of the international application must be filed with the Office by 30 months from the priority date to avoid abandonment "The International Bureau normally provides the copy of the international application to the Office in accordance with PCT Article 20. At the same time, the International Bureau notifies applicant of the communication to the Office. In accordance with PCT Rule 47.1, that notice shall be accepted by all designated offices as conclusive evidence that the communication has duly taken place. Thus, if the applicant desires to enter the national stage, the applicant normally need only check to be sure the notice from the International Bureau has been received and then pay the basic national fee by 30 months from the priority date." Notice of Jan. 7, 1993, 1147 O.G. 29 to 40, at 35-36. See item 14c below.*

a. [X] is transmitted herewith.

b. [ ] is not required, as the application was filed with the United States Receiving Office.

c. [ ] has been transmitted

i. [ ] by the International Bureau.
Date of mailing of the application (from form PCT/IB/308): _____.

ii. [ ] by applicant on _____.
Date

4. [X] A translation of the International application into the English language (35 U.S.C. 371(c)(2)):

a. [ ] is transmitted herewith.

b. [ ] is not required as the application was filed in English.

c. [ ] was previously transmitted by applicant on _____.
Date

d. [X] will follow.

5. [ ] Amendments to the claims of the International application under PCT Article 19 (35 U.S.C. 371(c)(3)):

NOTE: The Notice of January 7, 1993 points out that 37 C.F.R. § 1.495(a) was amended to clarify the existing and continuing practice that PCT Article 19 amendments must be submitted by 30 months from the priority date and this deadline may not be extended. The Notice further advises that: "The failure to do so will not result in loss of the subject matter of the PCT Article 19 amendments. Applicant may submit that subject matter in a preliminary amendment filed under section 1.121. In many cases, filing an amendment under section 1.121 is preferable since grammatical or idiomatic errors may be corrected." 1147 O.G. 29-40, at 36.

a. [ ] are transmitted herewith.
b. [ ] have been transmitted
   i. [ ] by the International Bureau.
   Date of mailing of the amendment (from form PCT/IB/308): _____.
   ii. [ ] by applicant on _____. (Date)
c. [ ] have not been transmitted as
   i. [ ] applicant chose not to make amendments under PCT Article 19.
   Date of mailing of Search Report (from form PCT/ISA/210): _____.
   ii. [ ] the time limit for the submission of amendments has not yet expired. The amendments or a statement that amendments have not been made will be transmitted before the expiration of the time limit under PCT Rule 46.1.

6. [ ] A translation of the amendments to the claims under PCT Article 19 (38 U.S.C. 371(c)(3)):
   a. [ ] is transmitted herewith.
   b. [ ] is not required as the amendments were made in the English language.
   c. [ ] has not been transmitted for reasons indicated at point 5(c) above.

7. [X] A copy of the international examination report (PCT/IPEA/409)
   [X] is transmitted herewith.
   [ ] is not required as the application was filed with the United States Receiving Office.

8. [ ] Annex(es) to the international preliminary examination report
   a. [ ] is/are transmitted herewith.
   b. [ ] is/are not required as the application was filed with the United States Receiving Office.

9. [ ] A translation of the annexes to the international preliminary examination report
   a. [ ] is transmitted herewith.
   b. [ ] is not required as the annexes are in the English language.

10. [X] An oath or declaration of the inventor (35 U.S.C. 371(c)(4)) complying with 35 U.S.C. 115
   a. [ ] was previously submitted by applicant on _____. (Date)
   b. [ ] is submitted herewith, and such oath or declaration
      i. [ ] is attached to the application.
      ii. [ ] identifies the application and any amendments under PCT Article 19 that were transmitted as stated in points 3(b) or 3(c) and 5(b); and states that they were reviewed by the inventor as required by 37 C.F.R. 1.70.

iii. [X] will follow.

Other document(s) or information included:

11. [X] An International Search Report (PCT/ISA/210) or Declaration under PCT Article 17(2)(a):
    a. [X] is transmitted herewith.
    b. [ ] has been transmitted by the International Bureau.
       Date of mailing (from form PCT/IB/308): _____.
    c. [ ] is not required, as the application was searched by the United States International Searching Authority.
    d. [ ] will be transmitted promptly upon request.
    e. [ ] has been submitted by applicant on _____.
       Date

12. [ ] An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98:
    a. [ ] is transmitted herewith.
       Also transmitted herewith is/are:
       [ ] Form PTO-1449 (PTO/SB/08A and 08B).
       [ ] Copies of citations listed.
    b. [ ] will be transmitted within THREE MONTHS of the date of submission of requirements under 35 U.S.C. 371(c).
    c. [ ] was previously submitted by applicant on _____.
       Date

13. [ ] An assignment document is transmitted herewith for recording.

A separate [ ] "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or[ ] FORM PTO 1595 is also attached.

_____
_____
_____

14. [X] Additional documents:
    a. [ ] Copy of request (PCT/RO/101)
    b. [X] International Publication No. WO 98/30416
       i. [X] Specification, claims and drawing
       ii. [ ] Front page only
    c. [X] Preliminary amendment (37 C.F.R. § 1.121)
    d. [ ] Other

_____
_____
_____

15. [X] The above checked items are being transmitted

a. [X] before 30 months from any claimed priority date.
b. [ ] after 30 months.

16. [ ] Certain requirements under 35 U.S.C. 371 were previously submitted by the applicant on _____, namely:

_____
_____
_____

AUTHORIZATION TO CHARGE ADDITIONAL FEES

WARNING: *Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges if extra claims are authorized.*

NOTE: *"A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).*

NOTE: *"Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).*

[X] The Commissioner is hereby authorized to charge the following additional fees that may be required by this paper and during the entire pendency of this application to Account No. 18-0013.

[X] 37 C.F.R. 1.492(a)(1), (2), (3), and (4) (filing fees)

WARNING: *Because failure to pay the national fee within 30 months without extension (37 C.F.R. § 1.495(b)(2)) results in abandonment of the application, it would be best to always check the above box.*

[X] 37 C.F.R. 1.492(b), (c) and (d) (presentation of extra claims)

NOTE: *Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.492(d)), it might be best not to authorize the PTO to charge additional claim fees, except possible when dealing with amendments after final action.*

[X] 37 C.F.R. 1.17 (application processing fees)
[X] 37 C.F.R. 1.17(a)(1)-(5)(extension fees pursuant to § 1.136(a).
[ ] 37 C.F.R. 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. 1.311(b))

NOTE: *Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of*

allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying . . . issue fee." From the wording of 37 C.F.R. § 1.28(b): (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

[X] 37 C.F.R. § 1.492(e) and (f) (surcharge fees for filing the declaration and/or filing an English translation of an International Application later than 30 months after the priority date).

Michael B. Stewart

SIGNATURE OF PRACTITIONER

Reg. No.: 36,018

Michael B. Stewart
(type or print name of practitioner)

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RADER, FISHMAN & GRAUER PLLC
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1533 N. Woodward Ave., Ste. 140
Bloomfield Hills, MI 48304

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Bretschneider et al.	
Serial No.:	09/341,225	Group Art Unit:
Filed:	07/07/99	Examiner:
For:	METHOD FOR MANUFACTURING A HEAT SHIELD AND HEAT SHIELD MANUFACTURED WITH THE METHOD	
Attorney Docket No.:	60680-1281 (4908 REIN)	Paper No.

Assistant Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Dear Sir:

Please amend the application as follows prior to examination on the merits.

IN THE SPECIFICATION

Please substitute the enclosed substitute specification for the one previously filed on behalf of Applicant.

IN THE CLAIMS

Please cancel pending claim 1 and add the following new claims 29-59.

29. (NEW) A method of manufacturing a heat shield suitable for use in motor vehicles comprising the steps of:

providing first and second plates, each said plate having an edge region and being at least partially plastically deformable;

providing an insulating material onto said first plate to cover at least a portion of said first plate;

compacting at least a portion of said insulating material; and

connecting said edge region of said first plate to said edge region of said second plate such that said insulating material is positioned between said first and second plate.

30. (NEW) A method as recited in claim 29, wherein the form of said insulating material is selected from the group consisting of powder and flakes.

31. (NEW) A method as recited in claim 29, wherein said first and second plates are connected at said end regions by a connection selected from at least one of the group consisting of a positive connection and a non-positive connection.

32. (NEW) A method as recited in claim 29, wherein said insulating material is comprised of a material selected from the group consisting of mica, expanded graphite, perlite, and a mica decomposition.

33. (NEW) A method as recited in claim 29, wherein said insulating material includes a filler.

34. (NEW) A method as recited in claim 29, wherein said compacting of said insulating material is achieved by movement of said second plate towards said first plate.

35. (NEW) A method as recited in claim 29, wherein said compacting of said insulating material is carried out by a pressing tool in at least one pressing movement.

36. (NEW) A method as in recited in claim 29, including the step of applying additional insulating material onto at least regions of said first plate and the previously compacted insulating material; and compacting said additional insulating material.

37. (NEW) A method as recited in claim 29, wherein said insulating material that is not compacted is removed.

38. (NEW) A method as recited in claim 29, wherein said insulating material is applied substantially evenly on said first plate.

39. (NEW) A method as recited in claim 29, wherein said insulating material is provided on said first plate in the shape of a cone; and wherein said compacting of said insulating material distributes said insulating material on said first plate.

40. (NEW) A method as recited in claim 29, wherein said first plate is partially deformed prior to providing said insulating material.

41. (NEW) A method as recited in claim 40, wherein said first plate is at least partially deformed in the shape of a trough.

42. (NEW) A method as recited in claim 39, wherein an inorganic binding material is applied to said first plate prior to providing said insulating material.

43. (NEW) A method as recited in claim 29, wherein at least one of said plates includes a surface formation to facilitate the distribution of said insulating material upon compaction.

44. (NEW) A method as recited in claim 29, wherein said second plate is at least partially flanged to said edge of said first plate.

45. (NEW) A method as recited in claim 29, wherein the compacting of said insulating material is controlled so that the space between said first and second plates that is not used to physically connect said plates is completely covered with insulating material.

46. (NEW) A method as recited in claim 29, wherein the heat shield is three-dimensionally deformed after said first and second plates are connected.

47. (NEW) A method as recited in claim 29, wherein at least a portion of said first plate is electrostatically charged prior to the application of said insulating material and said insulating material applied to the non-charged portion of said first plate is removed prior to compaction.

48. (NEW) A method as recited in claim 29, including the step of removing a portion of said insulating material from said first plate with a tool that is electrostatically charged in certain regions.

49. (NEW) A heat shield suitable for use in motor vehicles comprising:

a first plate that is at least partially plastically deformable;

a second plate that is at least partially plastically deformable; and

an insulating material;

wherein said first plate is connected to said second plate and said insulating material is positioned between said first plate and said second plate.

50. (NEW) A heat shield as recited in claim 49, wherein said insulating material is comprised of a material selected from the group consisting of mica, expanded graphite, perlite, and a mica decomposition product.

51. (NEW) A heat shield as recited in claim 49, wherein said insulating material is in a form selected from the group consisting or powder and flakes.

52. (NEW) A heat shield as recited in claim 49, wherein at least one of said first and second plates is comprised of metal.

53. (NEW) A heat shield as recited in claim 49, wherein at least one of said first and second plates includes a surface deformation.

54. (NEW) A heat shield as recited in claim 53, wherein said surface deformation includes a deformation selected from the group consisting of bulges, beads, or webs.

55. (NEW) A heat shield as recited in claim 49, wherein at least one of said first and second plates has a surface with increased roughness as compared to a corresponding surface of said other plate.

56. (NEW) A heat shield as recited in claim 49, wherein at least one of said first and second plates includes a surface that is coated with a material that reflects radiated heat.

57. (NEW) A heat shield as recited in claim 56, wherein the plate positioned on the side of the heat shield that is remote from the radiated heat includes a modification selected from the group of modifications consisting of (a) increased thickness, (b) the inclusion of one or more ribs, and (c) the inclusion of a material having good heat-conducting capacity.

58. (NEW) A heat shield as in recited in claim 49, wherein the thickness of said insulating material positioned between said first and second plate is varied at different locations between said first and second plate.

59. (NEW) A heat shield as recited in claim 49, wherein predetermined portions of the heat shield are kept free of said insulating material.

REMARKS

Prior to a formal examination of the above-identified application, acceptance of the new claims and the enclosed substitute specification (under 37 CFR 1.125) is respectfully requested. It is believed that the substitute specification and new claims will facilitate processing of the application in accordance with M.P.E.P. 608.01(q). The substitute specification and new claims are in compliance with 37 CFR 1.52 (a and b) and, while making no substantive changes, are submitted to conform this case to the formal requirements and long-established formal standards of U.S. Patent Office practice, and to provide improved idiom and better grammatical form.

The enclosed substitute specification is presented herein in both marked-up and clean versions.

STATEMENT

The undersigned, an attorney registered to practice before the office, hereby states that the enclosed substitute specification includes the same changes as are indicated in the mark-up copy of the original specification. The substitute specification contains no new subject matter.

Respectfully submitted,

John P. Guenther

Michael B. Stewart (Reg. No. 36,018)
John P. Guenther (Reg. No. 39,698)
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Attorney for Applicants

CERTIFICATE OF MAILING

I hereby certify that the enclosed Preliminary Amendment is being deposited with the United States Postal Service on the date shown below with sufficient postage as Express Mail Post Office to Addressee mailing Label Number EL429915448US in an envelope addressed to the: Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Date: 9-29-99 By: Stephanie A. Stash

R0062757

60680-1281 (4980 REIN)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Bretschneider, et al

Filed: Herewith

Int'l Filing No.: PCT/DE98/00065

Int'l Filing Date: 07 January 1998 Examiner:

For: METHOD FOR PRODUCING A HEAT SHIELD AND HEAT SHIELD PRODUCED BY THIS METHOD

Attorney Docket No.: 60680-1281 (4980 REIN) Paper No.

Assistant Commissioner of Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

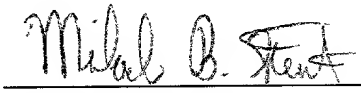
Dear Sir:

Please amend the application as follows prior to examination on the merits.

IN THE CLAIMS

Please cancel claims 2-28 of the application.

Respectfully submitted,



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60680-1281 (4980 REIN)

CERTIFICATE OF MAILING

I hereby certify that the enclosed Preliminary Amendment is being deposited with the United States Postal Service on the date shown below with sufficient postage as Express Mail Post Office to Addressee mailing Label Number EL323240991US in an envelope addressed to the: Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Date: 7-7-99 By: Stephanie A. Stash

R0058796

Method for manufacturing a heat shield and a heat shield manufactured with the method

The invention relates to a method and a heat shield produced with this method according to the preamble of patent claim 1. The correspondingly manufactured heat shield is intended to be suitable for use in motor vehicles and to protect there temperature-sensitive assemblies, components and connection lines in such a way that heat radiation cannot impact directly and, moreover, the heat shield acts as insulation. Furthermore, it is intended to have favourable sound-proofing qualities.

The need for the use of heat shields has greatly increased in motor vehicles. This is essentially caused by the fact that the space available in the engine compartments of motor vehicles has to be exploited to the maximum in order to accommodate the assemblies, components and connection lines necessary for operation, such that these parts have to be arranged very close to one another. This leads to heat-sensitive components having to be arranged very close to very hot components, such as for example the exhaust system, the combustion engine or the heat exchanger. The heat radiated by these elements can activate the functioning of the heat-sensitive components. To this end, the heat-sensitive elements or components are protected from the heat radiation and the high temperatures by heat shields arranged in front of them.

From DE 38 34 054 C2 is known a correspondingly configured heat shield, in which, in order to protect from heat radiation, at least two flat materials are used which are connected to one another on at least two edge regions turned away from one another. The flat materials mentioned are connected to one another in such a way that a gap is formed between them. Moreover, with this known heat shield it is important that the flat material facing the source of the heat radiation is so oriented in its expansion characteristic by pre-determined profiling or beading or

corresponding choice of material that it expands towards the heat source. Through corresponding configuration, adaptation to the heat load arising should be made possible, since with higher temperatures the spacing of the two flat materials used, which should preferably consist of sheet metal is increased and an enlarged air gap is produced which naturally improves the insulation effect.

The heat shield described in DE 38 34 054 C2 can then be further improved in relation to its insulating effect if a heat insulation layer is applied in addition to the inner surfaces of the flat materials proposed there. As suitable insulating materials are here proposed organic or inorganic fibre materials, but also metallic woven fabrics, knitted fabrics or expanded metals (grids), which are also intended to improve the soundproofing.

The heat shield described there has a substantial disadvantage in the fact that it is not possible for every conceivable contour of the heat shield to be configured, in order to achieve the desired effect for adaptation to the different temperatures.

Moreover, the insulation effect is limited if only an air gap is used without additional heat-insulating materials.

If on the other hand, as explained already, heat-insulating layers are applied, then in return increased manufacturing outlay has to be put up with. For the application of the heat-insulating materials as a heat-insulating layer, binding agents are necessary which generally have organic components which cause problems at the high temperatures.

Furthermore, in DE 39 05 871 C2, a compound material for heat insulation and sound proofing for screening parts and heat shields in the automobile field are described. An insulation layer, consisting of a thermally resistant highly porous inorganic material is here used which is enclosed on at least one side with a stabilising, structurally fixed covering layer, preferably a metal foil. This covering layer surrounds the insulation layer in one example completely, or, in the case

where the compound material, formed from an insulation layer and the covering layer, is disposed on the surface of a screening part, on the side turned away from the surface of the screening part.

For the insulation layer, various inorganic materials are mentioned which are preferably foamable (water glass, foamed glass, glass concrete, foamed ceramic or clay mineral materials) and thermally resistant reinforcing fibres or flakes (mica or graphite). The insulation layer of the compound material described there should be manufactured by foaming of a suitable material. The foamed material is then surrounded with the covering layer already mentioned. Here, besides the relatively high manufacturing outlay, what has proved disadvantageous is that the foamed material has, after it has hardened, a specific shape which can only be altered slightly or with additional outlay. This leads to problems and to increased technological outlay in the manufacture of heat shields, when more complicated shapes are necessary for same.

From DE 39 05 871 C2 can be taken the idea that to the actual insulation layer material should be added thermally resistant fibres or flakes (mica or graphite) which are intended to improve in particular the mechanical properties.

A further disadvantage of heat shields manufactured according to this theory consists in the fact, that greater forces acting on these heat shields can lead to deformations, or even to rupturing of the insulation layer material. This can lead to impairment of the actual functioning, and in conjunction with vibrations, to noise.

Moreover, it must be guaranteed that the composite material described in DE 39 05 871 C2 is surrounded by outer covering layers and a connection with the screening part must be ensured, which prevents vibrations occurring which can lead to annoyance caused by noise.

Proceeding from the above, the object of the invention is to propose a method and a heat shield manufactured with this method, the method being intended to be

simple and able to be carried out at a favourable cost, and the heat shield manufactured with this method being safe from every toxicological and ecological point of view.

According to the invention, this object is achieved with the features of patent claim 1 for the method and with the features of claim 21 for the heat shield manufactured with the method. Advantageous embodiments and developments of the invention arise with the use of the features mentioned in the subordinate claims.

For the manufacture of a heat shield according to the invention, insulating material in powder or flake form is used. This insulating material is applied loose to a plate which consists of at least one material which is partially plastically deformable. Here it is possible for only one portion of the surface to be covered by the insulating material. In particular, the edge regions or the regions for apertures (screw holes) of the plate should be kept free.

Vermiculite, a decomposition product of mica, has proved to be particularly suitable as an insulating material. But mica itself can also be used, or expanded graphite or perlite. It is also possible to add fillers to the insulating material, such as sand for example.

Following the trickling-on process, a second plate with a pressing tool, or a pressing tool on its own, is moved towards the sprinkled surface of the first plate, and the insulating material, trickled loose onto the first plate, is if necessary distributed, and after a sufficient compressive force has been applied to the insulating material by means of the two plates or the pressing tool, in one or more pressing cycles, and compaction of the insulating materials has been achieved at least in regions, the two plates are connected to one another in their edge regions. The procedure can also be such that the compressing of the insulating material takes place after the feeding of the two plates in the direction of the first plate shortly before the connection in the edge region takes place, i.e. the compaction is

a separate step. It is not absolutely necessary here for the edge to be completely closed. For connecting the two plates to one another, suitable positive and/or non-positive connections can be considered. However it has been shown that flanging of the edges on at least two opposite sides of the plates to be connected to one another is sufficient. Reliable enclosure of the insulating material between the two plates is however given if the edges are flanged on all sides.

The method according to the invention can, however, also be carried out in such a way that, after the loose application of insulating material on the first plate, for example with a pressing tool, the insulating material is compacted and thereafter pre-determinable regions can be deliberately provided with additional insulating material in a loose form, which regions are then in turn compacted under pressure applied with a second pressing tool, which can be correspondingly contoured, or with the second plate. By this means, regions of the heat shield can be deliberately so manufactured that they have on the one hand higher compaction and on the other hand increased thickness, so that the desired properties can be deliberately influenced, also taking into consideration the sound proofing.

The process can be carried out very simply, and thus it is possible for the insulating material to be distributed with a suitable conveying or feeding device more or less evenly on the first plate. Storage containers in the form of hoppers with an aperture can, for example, serve as feeding devices. From this hopper the insulating material can be applied to a conveyor belt, from which it is then led onto the first plate. Application from the hopper via two counter-rotating rollers is also possible. Doctor blades can also be arranged at suitable points. A second variant consists in the fact that the insulating material used is so trickled on that a cone of material forms, which then, proceeding from the top of the cone, is pressed together with the second plate or a pressing tool, and thus the insulating material is distributed.

The place where the cone of material is formed can then be so selected that optimum distribution of the insulating material between the two plate-shaped structures is produced. Normally this will be the area centre of mass of the plate, on which the insulating material is trickled. The arrangement of the cone of material on the plate can however also be adjusted to conditions which may be necessary, such as the final shape of the heat shield to be manufactured or taking into account a special region which has to have an increased insulating effect.

In the distribution of the insulating material in powder or flake form, it is advantageous that here no binding agent has to be added and the individual grains or flakes can be distributed almost unhindered. Avoiding a binding agent has furthermore the advantage that no ecological and toxicological aspects have to be taken into account in the manufacture and use of the heat shields manufactured according to the invention, and there are also no problems in disposal.

Before the insulating material is trickled on, the first plate can be deformed at least partially trough-shaped, in order to prevent the insulating material trickled onto it from being lost. The deformation is preferably undertaken at the edges and can then be used subsequently in the actual connection of the two plates, between which the insulating material is to be received.

Losses of insulating material after trickling-on, can, moreover, be prevented, or at least reduced, if before the trickling-on of the insulating material, the surface on the first plate, which forms the base for the cone of material, is provided with an inorganic binding agent, preferably water glass, which is physiologically and ecologically safe.

Moreover, the distribution of the insulating material between the two plates can be deliberately influenced by recesses protrutions being worked in, into which a greater volume of insulating material can be received and consequently the insulating capacity of the heat shield can there be locally increased, which can be

advantageous for certain uses. A further possible way of influencing the distribution of the insulating material in specific regions of the heat shield can, however, also be achieved in that beads and/or webs are present on at least one of the two plates or on a pressing tool, which on the one hand can receive more insulating material or, on the other hand, the webs are so configured that insulating material, after being trickled on, can be displaced deliberately from specific regions, or specific regions, (e.g. regions with screw holes) can be more strongly compacted.

According to the invention, however, it is also possible for the process to be carried out in such a way, that after the loose application of the insulating material, the compaction is carried out with a pressing tool, provided with recesses or apertures, or respectively a stepped pressing tool, such that non-compacted regions are formed, from which the loose insulating material can subsequently be removed. These regions should preferably be formed where for example screw holes are provided for fastening the heat shield. The removal of the non-compacted insulating material can here come about in simple manner through blowing away or through suction.

A further possible way of configuring regions which are to be kept free of insulating material consists in, before the loose application of the insulating material, certain regions on the first plate, which can also be pre-determined, being electrostatically charged, and, after the application of the insulating material, the latter being removed from the non-charged regions. Following the removal of the undesired insulating material, the retained insulating material can then be compacted, as already described, and thereafter covered with the second plate.

In contrast thereto, however, there also exists the possibility of applying insulating material loose to the first plate and then removing it again with a tool which is electrostatically charged in regions. For this purpose, a plate-shaped element, but

also a drum-shaped element, can be charged electrostatically on the surfaces, correspondingly in regions.

Thereafter the remaining insulating material, can be compacted as already described.

It is advantageous so to form especially edge regions, regions with narrow radii, that at least the amount of insulating material in these regions is reduced.

Since the heat shield, after the connection of the two plates, is not a rigid body, and the plates generally consist advantageously of a metal, additional three-dimensional deformation can easily be undertaken, and in this way the finally desired contour, which is optimally adapted to the necessary fitting circumstances in the engine compartment of a motor vehicle, are achieved. In this deformation, no problems occur through the enclosed insulating material, since no or at least only low binding forces between the individual grains or flakes have to be broken up, and the latter slide past one another only slightly hindered during the deformation, and the new shape can be achieved.

Foregoing a binding agent has furthermore the advantage that especially the soundproofing properties of the heat shield can be improved, since the soundwave energy can be very well decomposed with the aid of the mica in powder or flake form, and also there is no resultant long-term impairment. Naturally there are also no resonance problems which could lead to increased noise impairment.

However it can also be advantageous if at least one of the two plates has increased surface roughness on the surface which comes into direct contact with the insulating material, since this has a positive effect on the distribution of the insulating material during the movement of the second plate onto the first plate and increased adhesion of the insulating material after being trickled on counteracts any undesired falling of insulating material.

In order to improve the effect of the heat shield, it is moreover advantageous if at least one of the plates is used with a coating applied on at least one side and reflecting the heat radiation. This coating should preferably be orientated towards the heat source.

To carry away heat, it is advantageous if the plate which is disposed on the side turned away from the heat source is thicker, and provided with ribs and/or consists of a material with good heat-conducting capacity, such that the received heat can be led away well.

The invention is to be described below in greater detail with the aid of embodiments. The figures show here:

Fig. 1 an amount of insulating material trickled onto a plate;

Fig. 2 a sectional view of an embodiment of a heat shield manufactured according to the invention;

Fig. 3 a front elevation of a plate for an embodiment of a heat shield according to the invention and a second plate which may be connected to the first plate to form a heat shield, and

Fig. 4 a further embodiment in partial sectional view.

In Fig. 1 is shown how a first plate 1 has been sprinkled with insulating material (mica in powder and/or flake form) on a portion of a surface which is configured practically flat. The sprinkling with the insulating material 3, in this example, took place by forming a cone of the material, this sprinkling can however take place over a somewhat larger surface. The edge regions or other regions of the plate 1 should preferably be deliberately not sprinkled or subsequently freed of insulating material 3.

On the embodiment shown in this figure, the edges of the plate 1 are bent upwards, in order to prevent sideways falling of insulating material 3. There is, however, also the possibility, which is not shown in this figure, of bending over the front edges of the plate 1 and producing a complete trough shape.

The arrow shown in Fig. 1 indicates the direction in which a second plate 2, not shown, is pressed towards the first plate 1. The pouring of the insulating material 3 is distributed relatively evenly with the movement of the non-represented plate 2, and in preferred form, the pressing force and the amount (especially the volume) of the trickled-on insulating material should be matched to one another in such a way that after the two plates have been connected, the insulating material 3 completely fills the space between the first plate 1 and the second plate 2.

The section, shown in Fig. 2, through an example of a heat shield configured according to the invention, then shows how the edges of the first plate 1 can bend over the front edges of the second plate 2, and thus the connection of the two plates 1 and 2 can be produced. The flanged region is then suitable for the mounting of the finished heat shield and the engagement of suitable fastening elements.

On the example shown in Fig. 2, the deformation of the first plate 1 occurs exclusively to connect it with the second plate 2, and the second plate 2 is deformed during pressing against the first plate 1 as a result of the limited incompressibility of the insulating material 3. This can be achieved by suitable contouring of the pressing tool in connection with the already-mentioned optimised measurement of the volume of the insulating material to be used. Naturally, however, the first plate 1 can also be deformed correspondingly, if it is disposed in a correspondingly contoured die.

In Fig. 3 are represented two possible embodiments for the first plate 1 and the second plate 2.

Here the first plate 1 is provided with bulges 5, which are disposed locally in such a way that specific regions, in which the thermal load has to be particularly reduced, can be taken into account. In the manufacture according to the invention of such a heat shield, a larger amount of insulating material 3 is then distributed into the bulges 5, and consequently the insulating effect of the heat shield is increased there.

The second plate 2, which is represented in Fig. 3, is provided with a bead 6 which, during the manufacture of the heat shield according to the invention, can likewise deliberately influence the distribution of the trickled-on insulating material 3, since insulating material 3 is displaced in the region of the bead 6. Instead of the bead 6, however, a web can also be used.

The configurations of the bulges 5 or those of one or more beads 6 have, moreover, the advantage that the stability of the heat shield can be additionally increased.

The first and second plates 1 and 2, shown in Fig. 3, can be used both individually and together to manufacture a heat shield according to the invention, the embodiments then not having to be limited to the configuration and arrangement shown, but, for example, a crosswise arrangement of a plurality of beads or webs can be used.

Fig. 4 shows a further embodiment of a heat shield configured according to the invention, in partial sectional view, in which in particular the part is shown in which a screw hole 7 is formed.

Here, during the manufacture of this heat shield, the process is such that the region of the screw hole 7 is left free when the insulating material 3 is applied, or this region, as referred to in more detail in the specification already, is freed after the application of insulating material 3. Thereafter, there is compaction of the insulating material with a pressing tool in at least one working cycle, and after this first compaction, insulating material is, in this example, applied again in a circular

manner around the screw hole 7, and thereafter the second plate 2 is pressed with a correspondingly contoured pressing and stamping tool against the insulating material 3, towards the first plate 1. Here, particularly the insulating material 3 subsequently applied in region 8 is compacted, and the two plates 1 and 2 are correspondingly deformed, the first plate 1 being advantageously disposed on a correspondingly configured die for this purpose. The pressing tool to be used stamps in the same working cycle the actual screw hole 7 in the heat shield and it is thus possible to produce, with relatively low manufacturing outlay, a very advantageous embodiment of a heat shield according to the invention, in which a through-hole 7 has to be present for fastening or for other purposes. The material accumulation in region 8 here causes substantially better heat and sound insulation in this particularly critical region.

Patent Claims

1. Method of manufacturing a heat shield for use in motor vehicles, consisting of an insulating material which is received between two at least partially plastically deformable plates,

characterised in that

insulating material (3), in powder and/or flake form, is applied loose to one of the two plates (1, 2) at least partially covering same,

and, at least in regions, is compacted under pressure,

and the second plate (2), in a position lying above the insulating material (3) is connected with the first plate (1) through a positive and/or non-positive connection of the plates (1, 2) in their edge regions.

2. Method according to claim 1, characterised in that, as insulating material is used mica, expanded graphite, perlite or a mica decomposition product such as vermiculite.

3. Method according to claim 2, characterised in that, the insulating material contains fillers such as sand.

4. Method according to at least one of claims 1 to 3, characterised in that, the compaction of the insulating material (3) is achieved by movement of the second plate (2) towards the first plate (1).

5. Method according to at least one of claims 1 to 4, characterised in that the compaction of the insulating material (3) is carried out with a pressing tool in at least one pressing movement.

6. Method according to claim 5, characterised in that the work is done with a stepped pressing tool.

7. Method according to one of claims 1 to 6, characterised in that, following the first compaction, a further amount of insulating material (3) is applied loose to the surface of the first plate (1), completely or in locally delimited regions, and is then compacted under the effect of pressure.

8. Method according to one of claims 1 to 7, characterised in that the compaction of the insulating material (3) is carried out in regions by means of a pressing tool provided with recesses, and/or subsequently the insulating material (3) applied in the non-compacted regions is removed.

9. Method according to one of claims 1 to 8, characterised in that the non-compacted insulating material is blown away or sucked away or removed electrostatically.

10. Method according to one of claims 1 to 9, characterised in that the insulating material (3) is applied at least in the first application via a suitable conveying and feeding device, practically evenly on the first plate (1).

11. Method according to one of claims 1 to 10, characterised in that the insulating material (3) is trickled on in the shape of a cone and is distributed by displacement with the second plate (2) or the pressing tool, proceeding from the tip of the cone (4) during the movement of the second plate (2) onto the first plate (1) towards the insulating material (3).

12. Method according to one of claims 1 to 11, characterised in that the cone (4) of material is formed in the region of the area centre of mass of the first plate (1).

13. Method according to one of claims 1 to 12, characterised in that the first plate (1) is deformed at least partially in a trough shape before the trickling-on of the insulating material (3).

14. Method according to one of claims 1 to 13, characterised in that the surface of the first plate (1) which forms the base of the cone (4) of material is provided with an inorganic binding material before the trickling-on.

15. Method according to one of claims 1 to 14, characterised in that the distribution and/or compaction of the insulating material (3) is deliberately influenced by bulges (5), beads (6) and/or webs in/on at least one of the two plates (1,2) or of a pressing tool used for the compaction.

16. Method according to one of claims 1 to 15, characterised in that the second plate (2) is connected by at least partial flanging at the edge with the first plate (1).

17. Method according to one of claims 1 to 16, characterised in that the contact pressure of the second plate (2) or of the pressing tool against the first plate (2) and the insulating material (3) are so matched to the amount of insulating material (3) that the space between the two plates (1,2) is completely filled with insulating material.

18. Method according to one of claims 1 to 17, characterised in that the heat shield is three-dimensionally deformed after the two plates (1,2) have been connected.

19. Method according to claim 1,

characterised in that regions, which may be predetermined, of the first plate (1) are electrostatically charged before the loose application of the insulating material (3),

and the insulating material (3) is removed before compaction in the non-charged regions.

20. Method according to claim 1,

characterised in that, after the loose application of the insulating material (3), insulating material is removed from the first plate (1) before compaction with a tool which is electrostatically charged in regions.

21. Heat shield produced with a method according to at least one of claims 1 to 20,

characterised in that

mica in powder and/or flake form is received as insulating material (3) between two plates (1, 2), connected to one another in a positive or non-positive manner and consisting of at least partially plastically deformable material.

22. Heat shield according to claim 21,

characterised in that at least one of the two plates (1, 2) is a metal.

23. Heat shield according to claim 21 or 22,

characterised in that at least one of the plates (1, 2) is provided with bulges (5), beads (6) and/or webs.

24. Heat shield according to one of claims 21 to 23,

characterised in that the surface in contact with the insulating material (3) of at least one of the two plates (1, 2) has an increased surface roughness.

25. Heat shield according to one of claims 21 to 24, characterised in that at least one of the two plates (1, 2) is provided on at least one side with a coating which reflects heat radiation.

26. Heat shield according to one of claims 21 to 25, characterised in that the plate (1,2) arranged on the side of the heat shield remote from the heat radiation is configured thicker, provided with ribs and/or consists of a material with good heat-conducting capacity.

27. Heat shield according to one of claims 21 to 26, characterised in that the thickness and/or compaction of the insulating material (3) received between the plates (1, 2) varies locally.

28. Heat shield according to one of claims 21 to 27, characterised in that regions, which may be predetermined, are kept free of insulating material (3).

Abstract

The invention relates to a method and a heat shield manufactured with the method. The correspondingly produced heat shield is intended to be particularly suitable for use in motor vehicles and to protect there temperature-sensitive assemblies, components and connection lines in such a way that heat radiation cannot impact directly and, moreover, the heat shield acts as insulation. Moreover, it is intended to have advantageous soundproofing properties. In the heat shield, insulating material is applied loose in powder form, between two plates which are at least partially plastically deformable, onto one of the two plates (1,2) covering it at least partially, then is compacted under pressure at least in regions, and then the second plate (2), in a position lying above the insulating material (3), is connected with the first plate (1) through a positive or non-positive connection of the plates (1, 2) in their edge regions.

Declaration and Power of Attorney for Patent Application
Erklärung für Patentanmeldungen mit Vollmacht

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METHOD FOR PRODUCING A HEAT SHIELD AND HEAT SHIELD PRODUCED BY THIS METHOD

the specification of which is attached hereto unless the following box is checked:

☒ was filed on 07 January 1998
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I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above and as amended in a preliminary amendment.

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197 00 628.0	Germany	10/January/1997	☐
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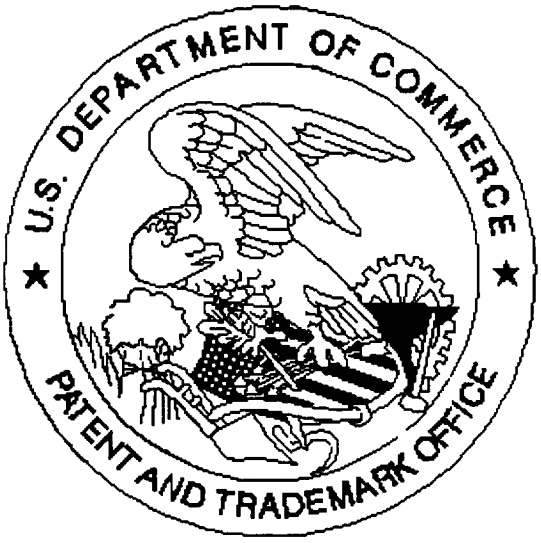

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